DATA SHEET

BU506; BU506D
Silicon diffused power transistors

Product specification
Supersedes data of December 1991
File under Discrete Semiconductors, SC06

1997 Aug 13

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Silicon diffused power transistors BU506; BU506D

DESCRIPTION

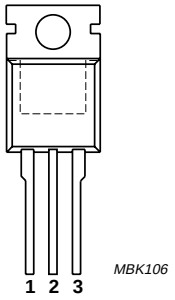
High-voltage, high-speed, switching NPN power transistor in a TO-220AB package. The BU506D has an integrated efficiency diode.

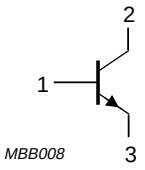
APPLICATIONS

- Horizontal deflection circuits of colour television receivers
- Line-operated switch-mode applications.

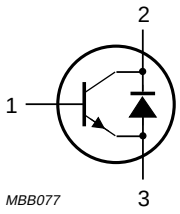
PINNING

PIN	DESCRIPTION
1	base
2	collector; connected to mounting base
3	emitter





a. BU506.



b. BU506D.

Fig.1 Simplified outline (TO-220AB) and symbols.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0	–	1500	V
V_{CEO}	collector-emitter voltage	open base	–	700	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 3 A; I_B = 1.33 A; see Fig.6	–	1	V
V_F	diode forward voltage (BU506D)	I_F = 3 A; see Fig.10	1.5	–	V
I_{Csat}	collector saturation current		–	3	A
I_C	collector current (DC)	see Fig.2	–	5	A
I_{CM}	collector current (peak value)	see Fig.2	–	8	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C; see Fig.3	–	100	W
t_f	fall time	inductive load; see Fig.9	0.7	–	µs

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	1.25	K/W

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0	–	1500	V
V_{CEO}	collector-emitter voltage	open base	–	700	V
I_{Csat}	collector saturation current		–	3	A
I_C	collector current (DC)	see Fig.2	–	5	A
I_{CM}	collector current (peak value)	see Fig.2	–	8	A
I_B	base current (DC)		–	3	A
I_{BM}	base current (peak value)		–	5	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C; see Fig.3	–	100	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

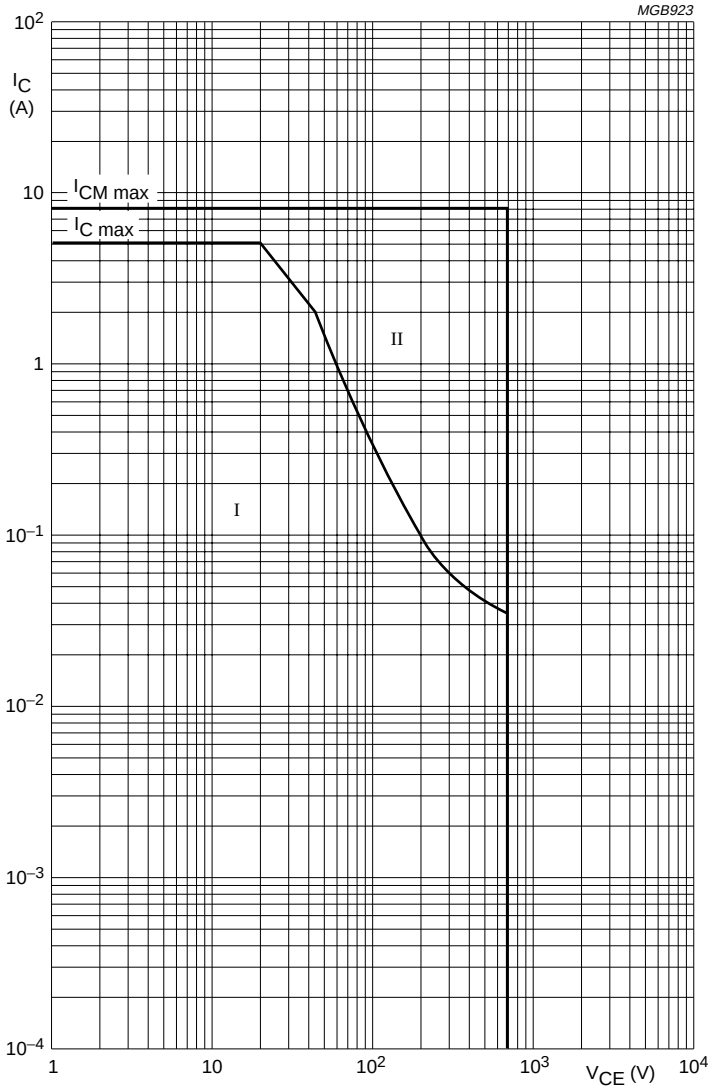
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CEOsust}$	collector-emitter sustaining voltage	see Figs 4 and 5	700	–	–	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 3 A; I_B = 1.33 A; see Fig.6	–	–	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 3 A; I_B = 1.33 A; see Fig.7	–	–	1.3	V
V_F	diode forward voltage (BU506D)	I_F = 3 A; see Fig.10	–	1.5	2.2	V
I_{CES}	collector-emitter cut-off current	$V_{CE} = V_{CESmax}$; V_{BE} = 0; note 1	–	–	0.5	mA
		$V_{CE} = V_{CESmax}$; V_{BE} = 0; T_j = 125 °C; note 1	–	–	1	mA
I_{EBO}	emitter-base cut-off current	V_{EB} = 6 V; I_C = 0	–	–	10	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 100 mA; see Fig.8	6	13	30	
Switching times in horizontal deflection circuit (see Fig.9)						
t_s	storage time	I_{CM} = 3 A; $I_{B(end)}$ = 1A; L_B = 12 µH	–	6.5	–	µs
t_f	fall time	I_{CM} = 3 A; $I_{B(end)}$ = 1A; L_B = 12 µH	–	0.7	–	µs

Note

1. Measured with a half-sinewave voltage (curve tracer).



T_{mb} = 25 °C.

I - Region of permissible DC operation.

II - Permissible extension for repetitive pulse operation.

Fig.2 Forward bias SOAR.

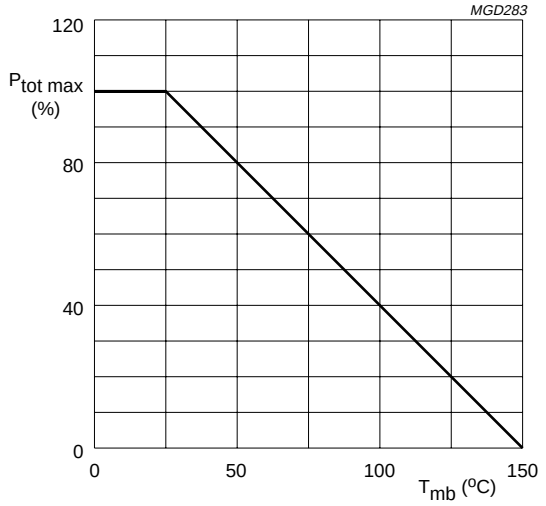


Fig.3 Power derating curve.

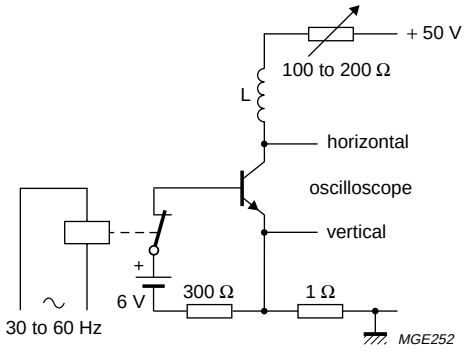


Fig.4 Test circuit for collector-emitter sustaining voltage.

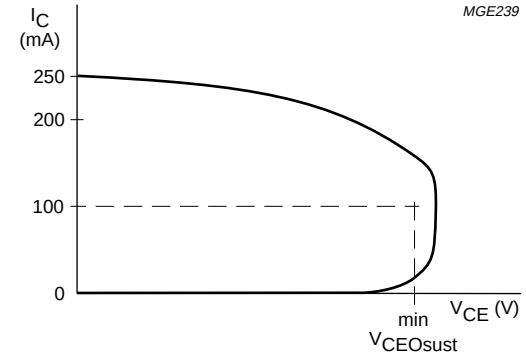
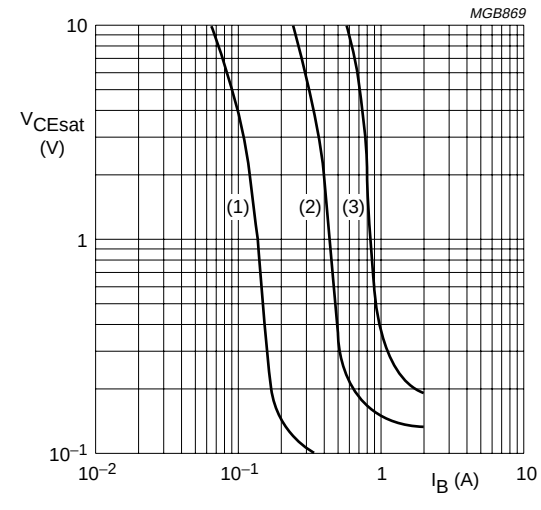
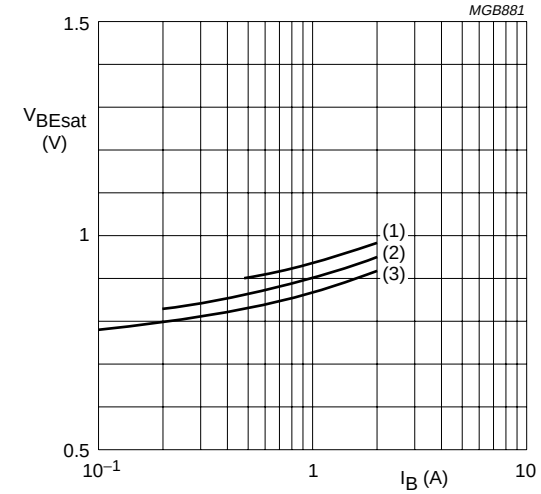


Fig.5 Oscilloscope display for collector-emitter sustaining voltage.



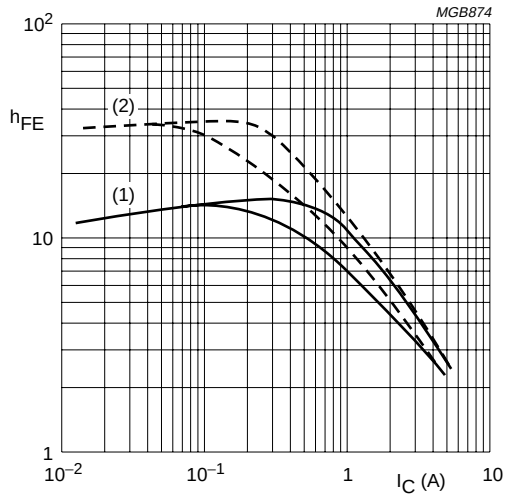
(1) I_C = 1 A.
(2) I_C = 2 A.
(3) I_C = 3 A.
T_{mb} = 25 °C.

Fig.6 Collector-emitter saturation voltage as a function of base current; typical values.



(1) I_C = 3 A.
(2) I_C = 2 A.
(3) I_C = 1 A.
T_{mb} = 25 °C.

Fig.7 Base-emitter saturation voltage as a function of base current; typical values.



(1) V_{CE} = 1 V; T_j = 25 °C.
(2) V_{CE} = 5 V; T_j = 125 °C.

Fig.8 DC current gain; typical values.

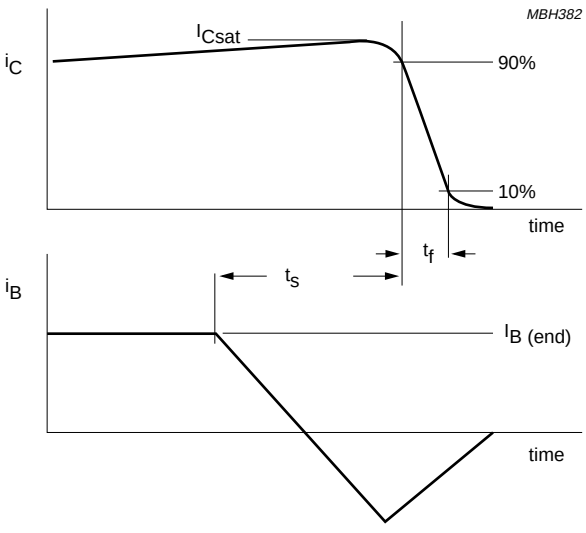
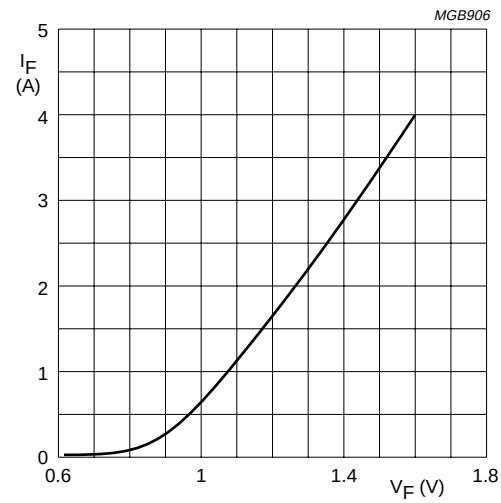


Fig.9 Switching time waveforms.

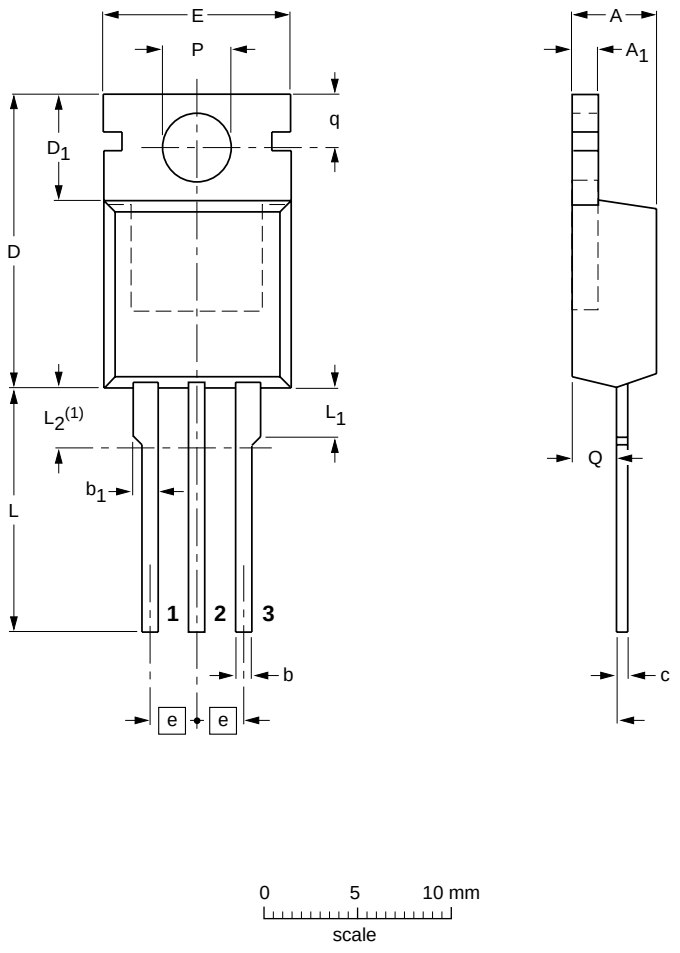


T_{mb} = 25 °C.

Fig.10 Diode forward voltage.

PACKAGE OUTLINE

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220 **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	D_1	E	e	L	L_1	$L_2^{(1)}$ max.	P	q	Q
mm	4.5 4.1	1.39 1.27	0.9 0.7	1.3 1.0	0.7 0.4	15.8 15.2	6.4 5.9	10.3 9.7	2.54	15.0 13.5	3.30 2.79	3.0	3.8 3.6	3.0 2.7	2.6 2.2

Note

1. Terminals in this zone are not tinned.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT78		TO-220				97-06-11

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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